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Indian Standard

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पैकेज्ड पाश्चुरीकृत दूध — विशिष्टि

(दूसरा पुनरीक्षण)

Packaged Pasteurized Milk — Specification

(Second Revision)

ICS 67.100.10

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भारतीय मानक ब्यूरो
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June 2020 **Price Group 4**

Dairy Products and Equipment Sectional Committee, FAD 19

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Dairy Products and Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

Milk is one of the most important article of food that is required in every household. Milk contains many essential nutrients, such as carbohydrates, proteins, lipids, minerals and vitamins. This makes it an ideal medium for rapid proliferation of most micro-organisms which degrade and alter its composition thus reducing its keeping quality and making it unfit for human consumption. Keeping the public health and also economic consideration in view, it is necessary that milk is pasteurized, so as to make it safe for human consumption as well as increase its shelf life.

In order to ensure the quality of the pasteurized milk, this standard was first issued in 1992. However, certain operational problems were faced in implementation of the standard, particularly with respect to the testing of the microbiological requirements which require much longer time of testing. The Committee was of the view that Methylene Blue Reduction (MBR) test is adequate for assessing the microbiological tests. In other countries also this test is being used for this purpose. It was also brought out that traditional test methods for plate count and coliform are time consuming and provide only retrospective data, therefore, waiting for results would not be pragmatic. The dairy plants should be required to maintain test records of these requirements for each lot/batch. The first revision was brought out in 1999 for separation of the microbiological requirements at plant level and for routine inspection and deletion of the provision of distribution through vending booths and covering only packaged pasteurized milk.

The second revision has been undertaken to harmonize the standard with *Food Safety and Standards Act*, 2006 and Regulations framed thereunder, and the major changes include:

The types of milk, storage temperature of pasteurized milk as well as microbiological requirements has been modified as per *Food Safety and Standards* (*Contaminants, Toxins and Residues*) *Regulations*, 2011;

An optional requirement for milk fortification has been added; and

Maximum permissible limits for urea, aflatoxin M_1, lead and arsenic has been specified.

In the formulation of this standard, due consideration has been given to the *Food Safety and Standards Act*, 2006 and Regulations framed thereunder, the *Legal Metrology Act*, 2009 and Rules framed thereunder and the *Essential Commodities Act*, 1955. However, this standard is subject to restrictions imposed under these, wherever applicable.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding-off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PACKAGED PASTEURIZED MILK — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements, methods of test and sampling for various types of packaged pasteurized milk.

2 REFERENCES

The following standards contain provision which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No./International Standard	*Title*
1165 : 2002	Milk powder (*fifth revision*)
1224 (Part 1) : 1977	Determination of fat by gerber method: Part 1 Milk
1392 : 1999	Glass milk bottles *(fourth revision)*
1479	Methods of test for dairy industry:
(Part 1) : 2016	Rapid examination of milk (*first revision*)
(Part 2) : 1961	Chemical analysis of milk
2491 : 2013	Food hygiene — General principles — Code of practice (*third revision*)
3382 : 1965	Specification for stainless steel milk pipes and fittings
4251 : 1967	Quality tolerances for water for processed food industry
5253 : 1969	Guidelines for cleaning and sterilizing dairy equipment
5401 (Part 1) : 2012	Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms: Part 1 Colony count technique (*second revision*)
5402 : 2012	Microbiology of food and animal feeding stuffs — Horizontal method for enumeration of microorganisms — Colony count technique at 30°C (*second revision*)
5887 (Part 3) : 1999 /ISO 6579 : 1993	Methods for detection of bacteria responsible for food poisoning: Part 3 General guidance on methods for the detection of *Salmonella* (*second revision*)
7768 : 1975	Sensory evaluation of milk
8479	Method for determination of phosphatase activity in milk and milk products:
(Part 1) : 1977	Routine method
(Part 2) : 1977	Reference method
10083: 1982	Method of test for determination of SNF (solids-not-fat) in milk by the use of lactometer
10500 : 2012	Drinking water — Specification (*second revision*)
11124 : 1984	Method for atomic absorption spectrophotometric determination of arsenic
11546 : 2012	Milk and milk products — Guidance on sampling (*second revision*)
11805 : 2007	Polyethylene pouches for packaging liquid milk (*second revision*)
12074 : 1987	Method for determination of lead by atomic absorption spectrophotometry
12333 : 2017	Milk, cream and evaporated milk — Determination of total solids content (reference method) (*second revision*)

IS No./International Standard	*Title*
13334	Skimmed milk powder :
(Part 1) : 2014	Standard grade (*second revision*)
(Part 2) : 2014	Extra grade (*first revision*)
13689 : 1992	Butter oil (butter fat)
13690 : 1992	Pasteurized butter
ISO 14501:2007	Milk and milk powder — Determination of aflatoxin M1 content — Clean-up by immunoaffinity chromatography and determination by high-performance liquid chromatography
14988 (Part 2) : 2002/ISO 11290-2 : 1998	Microbiology of food and feeding stuffs — Horizontal method for detection and enumeration of *Listeria monocytogenes*: Part 2 Enumeration method
ISO 14637 : 2004	Milk — Determination of urea content — Enzymatic method using difference in *p*H (reference method)
16639 : 2018/ ISO 20633 :2015	Infant formula and adult nutritionals — Determination of vitamin E and vitamin A by normal phase high performance liquid chromatography
ISO 20636 : 2018	Infant formula and adult nutritionals — Determination of vitamin D by liquid chromatography-mass spectrometry

3 DEFINITIONS

For the purpose of this standard the following definitions shall apply.

3.1 Milk

Milk is the normal mammary secretion derived from complete milking of healthy milch animal without either addition of thereto or extraction therefrom, unless otherwise specified. It shall be free from colostrum. Milk which is adjusted for milk fat or milk solid-not-fat content or both, may also be named "milk" provided that the limits of milk fat and milk solid-not-fat content of the adjusted milk conform to the specific type of milk as applicable (*see* **4**).

3.1.1 *Recombined Milk*

Recombined milk is a product resulting from the combination of milk fat and milk-solids-non-fat in their preserved forms with or without the addition of potable water to achieve similar end product characteristics and appropriate milk composition as per the standard for the specific type of milk. The source of milk-solids-non-fat shall be dried or concentrated milks only.

3.1.2 *Reconstituted Milk*

Reconstituted milk is a product resulting from the addition of potable water to the dried or concentrated form of milk in the amount necessary to re-establish the appropriate water-to-solids ratio to achieve similar end product characteristics and appropriate milk composition as per the standard for the specific type of milk for that product.

3.2 Milk Plant or Dairy

It shall include the building, machinery equipment and appliances necessary for collection, pasteurization, cooling, bottling or filling in other containers and storage of milk including those at intermediate chilling centers.

3.3 Pasteurization

It means a microbicidal heat treatment aimed at reducing the number of any pathogenic micro-organisms in milk and liquid milk products, if present, to a level at which they do not constitute a significant health hazard. Pasteurization conditions shall be designed to effectively destroy the organisms *Mycobacterium tuberculosis* and *Coxiella burnettii*.

4 TYPES OF MILK

4.1 Species Identified Milk

Species identified milk means milk as defined under **3.1** and obtained from either buffalo milk, cow milk, goat milk, sheep milk or camel milk. The fat and SNF content of species identified milk shall conform to the respective composition as prescribed under Food Safety and Standards (Food Product Standards and Food Additive) Regulations, 2011.

4.2 Mixed Milk

Mixed milk means any combination of species identified milk. The fat and SNF content of mixed milk shall conform to a fat and solids-non-fat percentage of 4.5 and 8.5 respectively. It shall remain homogenous for about 6 h and no deposition of solids shall take place on standing.

4.3 Full Cream Milk

Full cream milk means milk that has been standardized to a fat and solids-not-fat percentage minimum at 6.0 and 9.0 respectively by adjustment of fats/milk solids.

It shall remain homogenous for about 6 h and no deposition of solids shall take place on standing.

4.4 Standardized Milk

Standardized milk means milk that has been standardized to a fat and solids-non-fat percentage of 4.5 and 8.5 respectively. It shall remain homogenous for about 6 h and no deposition of solids shall take place on standing.

4.5 Toned Milk

Toned milk means milk that has been standardized to a fat and solids-not-fat percentage minimum at 3.0 and 8.5 respectively by adjustment or addition of milk solids and milk fat. It shall remain homogenous and no deposition of solids shall take place on standing.

4.6 Double Toned Milk

Double toned milk means the milk that has been standardized to a fat and solids-not-fat percentage minimum at 1.5 and 9.0 respectively by adjustment or addition of milk solids and milk fat. It shall remain homogenous and no deposition of solids shall take place on standing.

4.7 Skimmed Milk

Skimmed milk means the milk from which almost all the milk fat has been removed mechanically. It shall not have fat more than 0.5 percent and solids-not-fat should not be less than 8.7 percent. It shall be pasteurized. It shall remain homogenous and no deposition of solids shall take place on standing.

5 RAW MATERIAL

5.1 Milk

Milk intended for pasteurization shall be wholesome and shall be free from any added extraneous matter. It shall be tested for its freedom from preservatives, neutralizers and adulterants [*see* IS 1479 (Part I)]. Milk shall also be evaluated for acidity, bacterial load, temperature and organoleptic requirements (*see* IS 7768), so that these parameters can serve as guidelines to the processors for continual improvement in the quality. Milk with methylene blue reduction time of not less than 60 min in summer and 90 min in winter shall be accepted for pasteurization.

5.2 Milk Powder and Skimmed Milk Powder

Milk powder and skimmed milk powder if used in liquid milk shall conform to IS 1165 and IS 13334 (Part 1) or IS I3334 (Part 2) respectively.

5.3 Butter and Butter Oil

Butter and/or butter oil if used for adjustment of fat content in the milk shall conform to IS 13690 and IS 13689 respectively.

5.4 Water to be used as an ingredient shall conform to IS 10500.

6 PASTEURIZATION

All types of the milk defined under **4.1** to **4.7** shall be pasteurized by the method given in Annex A in such a way that every particle of milk reaches to at least 63°C and holding at such temperature continuously for at least 30 min or heating it to at least 72°C and holding at such temperature continuously for at least 15 s or an approved temperature time combination that will serve to give a negative Phosphatase Test that is applicable to milk immediately after pasteurization only. All pasteurized milk of different types shall be cooled immediately to a temperature of 4°C, or less.

7 HYGIENIC CONDITIONS

Milk shall be processed pasteurized, packed and handled under strict hygienic conditions as prescribed in IS 2491.

7.1 Milk Plant

The building where the milk is received, processed, bottled or filled in other containers, stored and where the equipment and containers are cleaned and sterilized shall be such that it satisfies the requirements laid down in IS 2491. The floors, walls and ceilings, doors and windows, lighting arrangement, ventilation, toilet and hand washing facilities shall also comply with the requirement of IS 2491.

7.2 Water Supply

The water supply shall conform to the tolerances specified for water for dairies as per IS 4251 or IS 10500 as applicable and shall be easily accessible and adequate.

7.3 Sanitary Piping

All pipings and fittings which come in contact with milk shall be of sanitary types which can be easily cleaned and sanitized (*see* IS 3382).

7.4 Equipment and Containers

Milk receiving equipment, storage tanks, pasteurizing and cooling equipment, cans, bottles, aluminum foils and other packing materials with which milk comes into contact shall be of smooth, impervious, noncorrosive, non-toxic material conforming to relevant Indian Standards, wherever available and so constructed as to be easily cleaned and sanitized.

7.5 Cleaning and Sanitization of Plant Equipment and Containers

The pasteurization plant and other equipment used for receiving, processing, storage and bottling, and milk cans, bottles and pouches used for filling milk, shall be cleaned and sanitized (*see* IS 5253).

7.5.1 After sanitization and during usage or storage, the equipment and containers shall be protected from contamination.

7.6 Surroundings and Waste Disposal

The immediate surroundings shall be kept neat and clean and proper arrangement made for the disposal of waste.

7.7 Personnel Health and Cleanliness

All employees and other persons handling milk or equipment in the plant shall be medically examined every six months by a competent authority and certified to be physically fit and free from infections or other communicable diseases. All persons working in the plant shall wear clean garments, preferably white suits and caps, and strictly adhere to rules of personal hygiene (*see* IS 2491).

8 REQUIREMENTS

8.1 The product shall be white or white with creamish/ greenish tinge. It shall be clean, wholesome and rich in taste. It shall be free from the defects given in Table 1.

8.2 Sensory evaluation, selection of panelist and training of the panelist shall be done in accordance with IS 7768. Number of trained panelist should be five to seven and should be checked for their consistency and acuity, once in three months..

Table 1 Defects in Milk

(*Clause* 8.1)

Sl No.	Characteristics	Defects
(1)	(2)	(3)
i)	Colour and appearance	Suspended particles, filth, foreign matter, blood cells, sediments
ii)	Odour	Stale, acidic,
iii)	Flavour	Barny, cowy, feed, lacks freshness/stale cooked, garlic/onion, oxidized – light induced, oxidized – metal induced, salty, astringent, fruity/ fermented, malty, bitter, unclean, rancid (hydrolytic), flat, foreign
iv)	Body	Watery, ropy, curdy

8.3 The product shall conform to the microbiological requirements prescribed in Table 2 and methylene blue reduction test time of not less than 5 h when tested in accordance with IS 1479 (Part 1).

8.4 The product shall also meet with the requirements given in Table 3.

8.5 Optional Requirements

Standardized milk, toned milk, double toned milk or skimmed milk be fortified with the following micronutrients, singly or in combination, at the level given in the Table 4.

Table 2 Microbiological Requirements for Packaged Pasteurized Milk

(*Clause* 8.3)

Sl No.	Characteristic	Requirement				Method of Test, Ref to IS or Cl. No.
		Sampling Plan 1)		Limit (cfu)		
		n	c	m	M	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(i)	*Salmonella sp.*	5	0	Absent/25 ml	NA	5887 (Part 3)
(ii)	*Listeria monocytogenes*	5	0	Absent/25 ml	NA	14988 (Part 2)
(iii)	Aerobic plate count	5	3	3 x 10^4/ml	5 x 10^4/ml	IS 5402
(iv)	Coliform count	5	0	<10/ml	NA	IS 5401 (Part 1)

Note: 1) For sampling plan see Annex B.

Table 3 Requirements for Packaged Pasteurized Milk

(*Clause* 8.4)

Sl No.	Characteristics	Requirements	Methods of Test, Ref to
(1)	(2)	(3)	(4)
i)	Milk fat, percent by mass	As per the limits prescribed in **4** based on the type of pasteurized milk	IS 1224 (Part 1) or IS 1479 (Part 2) *
ii)	Milk solids-not-fat (SNF), percent by mass	As per the limits prescribed in **4** based on the type of pasteurized milk	IS 10083 or IS 12333*
iii)	Phosphatase test	Negative	IS 8479 (Part 1) and IS 8479 (Part 2)*
iv)	Neutralizer	Absent	IS 1479 (Part 1)
v)	Urea	Not more than 700 ppm	IS 1479 (Part 1) or ISO 14637*
(vi)	Lead, *Max*	0.02 ppm	IS 12074
vii)	Arsenic, *Max*	0.1 ppm	IS 11124
viii)	Aflatoxin M$_1$, *Max*	0.5 ppb	ISO 14501

NOTES:

1 Approved and validated international test methods from ISO/ IDF/EN/APHA/ ASTM/ AOAC/ EPA may also be followed.

2 In case of dispute, methods given at column 4 and wherever indicated by '*' shall be the referee method.'

Table 4 Requirements for Fortified Packaged Pasteurized Milk

(*Clause* 8.5)

Sl No.	Nutrients	Maximum Level of Nutrient per litre of Standardized Milk/Toned/ Double Toned/Skimmed Milk	Methods of Test, Ref to	Source of Nutrient
(1)	(2)	(3)	(4)	(5)
i)	Vitamin A	270 µg RE-450 µg RE 1)	IS 16639	Retinyl acetate or retinyl palmitate
ii)	Vitamin D	5 µg – 7.5 µg 2)	ISO 20636	Cholecalciferol or ergocalciferol (only from plant source)

1) For Vitamin A (retinol): 1 IU = 0.3 µg RE (Retinol Equivalent)

2) For Vitamin D (cholecalciferol or ergocalciferol): 1 IU = 0.025 µg

9 STORAGE

Pasteurized milk shall be stored before packing in such a way that temperature of milk shall not exceed 5 ºC.

10 PACKING AND MARKING

10.1 Packing

Pasteurized milk shall be packed in clean, sound and sanitary containers made of glass (*see* IS 1392) or polyethylene pouches (conforming to IS 11805), properly sealed so as to prevent leakage and contamination.

10.2 Marking

10.2.1 The following information shall be marked legibly and indelibly on each container/pouch:

a) Name of the material 'Pasteurized milk';
b) Type of milk as applicable;
c) Batch or code number;
d) Date of packing and/or time;
e) Name of the manufacturer or processor;
f) Net volume, in ml or litre;
g) Best before or use by date -------, if stored in such a way that temperature of milk shall not exceed 5 ºC;
h) Fat ------- percent, solid-not-fat --------- percent;
j) Every package of fortified food shall carry the words 'Fortified with ………(name of the fortificant)'; and
k) Any other requirements under the *Food Safety and Standards (Packaging and Labelling) Regulations*, 2011 and the *Legal Metrology Act*, 2009 and Rules framed thereunder.

10.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

11 SAMPLING

Representative samples of pasteurized milk shall be drawn, handled, stored and tested for conformity to this standard by the method prescribed in IS 11546.

ANNEX A

(*Clause* 6)

PASTEURIZATION

A-L GENERAL

The pasteurization of milk shall be performed according to any of the procedure specified under **A-2**. The pasteurizing vat or pasteurizer shall be equipped with accurate temperature indicating and recording devices (thermograph). High Temperature Short Time (HTST) plants should be provided with automatic flow diversion valve. The output of the recording devices shall be available for inspection for at least six months.

A-2 METHOD

A-2.1 Holder Method

Milk is heated to at least 63 ^{o}C and held continuously at that temperature for at least 30 min and then immediately cooled in the same equipment to 4^{o}C or less.

A-2.2 High Temperature Short Time Method (HTST)

In this method milk is heated at least to 72 ^{o}C and held continuously at that temperature for at least 15 s and then immediately cooled in the same equipment to 4 ^{o}C or less.

ANNEX B

[*Table 2*]

SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

B-1 SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

The terms n, c, m and M used in this standard have the following meaning:

n = Number of units comprising a sample.

c = Maximum allowable number of units having microbiological counts above m for 2- class sampling plan and between m and M for 3- class sampling plan.

m = Microbiological limit that separates unsatisfactory from satisfactory in a 2- class sampling plan or acceptable from satisfactory in a 3-class sampling plan.

M = Microbiological limit that separates unsatisfactory from satisfactory in a 3-class sampling plan.

B-2 INTERPRETATION OF RESULTS

2-Class Sampling Plan (where n, c and m are specified)	**3-Class Sampling Plan (where n, c, m and M are specified)**
1. Satisfactory, if all the values observed are < m 2. Unsatisfactory, if one or more of the values observed are > m or more than c values are > m	1. Satisfactory, if all the values observed are < m 2. Acceptable, if a maximum of c values are between m and M and the rest of the values are observed as < m 3. Unsatisfactory, if one or more of the values observed are > M or more than c values are > m

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Dairy Products and Equipments Sectional Committee, FAD 19

Organization	*Representative(s)*
National Dairy Research Institute, Karnal	Dr R. R. B. Singh, (***Chairman***)
National Dairy Research Institute, Karnal	Dr Vivek Sharma Dr Rajesh Kumar Bajaj (*Alternate*)
All India Food Processors Association, New Delhi	Dr K. L. Gaba Mr Vijay Gaur (*Alternate*)
Bihar State Cooperative Milk Producers' Federation Ltd, (COMPFED), Delhi	Shri Sushil Kumar Shri Rupesh Raj (*Alternate*)
CONCERT, Chennai	Shri K. Ramachandran Mr M. R. Krishnan (*Alternate*)
Confederation of Indian Food Trade & Industry, New Delhi	Ms Priyanka Gupta Dr Anirudha Chhonkar (*Alternate*)
Confederation of Indian Industry, New Delhi	Ms Neha Aggarwal Ms Arti Gupta (*Alternate*)
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Envirocare Labs Pvt Ltd, Thane	Dr Nilesh Amritkar Ms Sabeena K. (*Alternate*)
Export Inspection Council of India, New Delhi	Dr J. S. Reddy Mr Vikas Dahiya (*Alternate*)
FICCI Research and Analysis Centre, New Delhi	Dr S. K. Manocha Dr Ajay Sharma (*Alternate*)
Food Safety and Standards Authority of India, New Delhi	Dr Monica Puniya Ms Tripti Tayal(*Alternate*)
Gujarat Cooperative Milk Marketing Federation Ltd, Anand	Mr Sameer Saxena Mr Sayan Banerjee (*Alternate*)
Haryana Dairy Development Coop. Federation Ltd, Panchkula	Mr S. S. Kohli Shri Y. P. Singh (*Alternate*)
IDMC Ltd, Anand	Mr Rajesh Subramanian Shri Devender Gupta (*Alternate*)
Indian Dairy Association, New Delhi	Dr G. S. Rajorhia Dr Satish Kulkarni (*Alternate*)
Indian Stainless Steel Development Association, Gurgaon	Mr Rohit Kumar Mr Rajat Aggarwal (*Alternate*)
Mother Dairy Fruit and Vegetable Ltd, Delhi	Ms Nita Sen Mr Shailender Kumar (*Alternate*)
National Dairy Development Board, Anand	Dr D. K. Sharma Shri Narinder Sharma (*Alternate*)

Organization	*Representative(s)*
National Institute of Nutrition, Hyderabad	Dr B. Santosh Kumar Shri Sylvia Fernandez Rao (*Alternate*)
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The Tamil Nadu Co-operative Milk Producers' Federation Limited, Chennai	Mr S. R. Sankar Mr T. M. James Dinakaran (*Alternate*)
Infant and Young Child Nutrition Council,	Dr Nirupama Sharma Mr Kiran Desai (*Alternate*)
Centre for Analysis and Learning in Livestock and Food (CALF), Anand	Dr Rajesh Nair Dr Rajeev Chawla (*Alternate*)
M/s Punjab State Cooperative Milk Producers' Federation Limited.	Dr Brar
Vimta Labs Limited, Hyderabad	Dr Jagdish Kodali Dr Muni Nagendra Prasad Poola (*Alternate*)
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Member Secretary

Suneeti Toteja
Scientist 'E', (FAD), BIS

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